

## **1.0 Introduction**

This document presents a guidance Protocol for the risk analysis of pipelines near schools for a specific regulatory purpose. The California Department of Education (CDE), School Facilities Planning Division (SFPD) has established standards for use by Local Educational Agencies (LEAs) (i.e., school districts, county offices of education and charter school entities) in the selection of safe and educationally appropriate school sites (authority per Education Code section 17251). These standards have been adopted by the State Board of Education in the California Code of Regulations Title 5, Section 14010 – Standards for School Site Selection. Both locally funded and state funded new school sites, and land expansions of existing sites, must comply with these standards as well as other requirements not described herein. CDE also requires that when seeking approval for new construction or modernization plans on existing school sites, LEAs certify that the project will not create nor substantially exacerbate an existing safety hazard, including those listed in Title 5 related to pipelines. In such cases, LEAs may also choose to follow the Protocol guidance in determining whether such certification is warranted.

This Protocol is a guidance document that has been prepared to assist LEAs with evaluating whether aboveground or underground petroleum, petroleum product, or natural gas pipelines pose an unreasonable safety hazard to a school campus. (In this Protocol, the terms “campus”, “school campus”, “campus site”, “school site”, etc. are all used to designate the property being evaluated.) This clarification is introduced to distinguish from the use of the word site that could be interpreted as referring to a hazard or an impact location. This Pipeline Risk Analysis Protocol process has been developed as guidance for risk analysis to determine whether a proposed site meets the CDE’s criteria, as established in Title 5. It is intended for reference and use by technical personnel charged with conducting the required pipeline risk analyses.

### **1.1 Background on California Department of Education Requirements for Pipeline Safety Determinations**

Safety is the first consideration in the selection of school sites. In selecting a school site, SFPD has identified safety factors that should be considered. Included in these Safety Factors is the proximity of high-pressure pipelines that transport petroleum, petroleum products, natural gas pipelines, or other hazardous substances that could present a safety hazard to the proposed school campus site. For the CDE requirements, a high pressure pipeline is defined as a pipeline operating at a pressure of 80 pounds per square inch gage (psig). The requirement also includes high volume water lines, regardless of pressure. This Protocol addresses only the petroleum,

petroleum product, natural gas and high volume water lines, in terms of data provided for making the necessary numerical estimates. Pipelines for gases other than natural gas, that are flammable or toxic, and for other hazardous liquid substances can be addressed using the same general methodology, but there are no data provided for preparing risk estimates. Such pipelines constitute a small fraction of the total pipeline mileage near schools and will have to be dealt with on a case-by-case basis. Practicing standard due diligence, LEAs should identify all such lines within 1,500 feet of the proposed project site. However, this Protocol analysis is limited to only those lines that operate at a pressure of 80 psig or above, which based upon commonly accepted conventions, is a divide between transmission pipelines and for natural gas, low pressure distribution mains.

A Pipeline Risk Analysis must be performed to estimate possible risk from a single pipeline or multiple pipelines that meet the applicability conditions.

#### **1.1.1 California Education Codes**

In addition to the Title 5 regulation described below, the California Education Code Section 17213 specifies that a school district may not approve a project involving the acquisition of a school site unless it determines that the property to be purchased or built upon does not contain a pipeline situated underground or aboveground that carries hazardous substances, acutely hazardous materials, or hazardous wastes, unless the pipeline is a natural gas line used only to supply that school or neighborhood.

#### **1.1.2 California Code of Regulations**

CCR Title 5, Section 14010(h) states that “the site shall not be located near an above-ground water or fuel storage tank or within 1,500 feet of the easement of an above ground or underground pipeline that can pose a safety hazard as determined by a risk analysis study, conducted by a competent professional.” CDE also applies this standard to joint-use acreage not acquired by the LEA, but used for school purposes.

### **1.2 Objectives of Pipeline Risk Analyses and the Protocol**

The purpose of this Protocol is to expedite the completion of the risk analyses that must be prepared for schools sites potentially vulnerable to pipeline failures and facilitate CDE’s review process. The purpose of pipeline risk analysis in the present context is to estimate a numerical value for the safety risk of a gas or hazardous liquid pipeline failure within 1,500 feet of any site proposed for school development and for comparison of the estimated risk with criteria recommended by CDE. The comparison will determine the extent to which additional risk control or mitigation measures might be required. As applied to high volume water lines,

the risk analysis is limited to estimates of flooding potential or other water-caused threats in the event of failure, and the need for mitigation of such an impact.

Mitigation measures for all pipelines could include a suggestion by CDE that the submitting LEA consider alternative campus sites. The Protocol provides a standard basis that allows a consistent risk analysis process and database. Also, because simplified graphs and tables have been developed for preparing a risk analysis, the level of effort and associated costs are minimized for a district.

The risk analysis is carried out using simplified graphs and tables because risk estimates of the gas and liquid releases for the stated purpose can be characterized by using a few key operating and design parameters.

This Protocol presents a three-stage approach for conducting a risk analysis. Stage 1 is a relative screening analysis that will indicate whether a school site meets pre-defined risk criteria based on certain characteristics of commonly encountered pipeline and site situations.

If a proposed site does not meet the Stage 1 requirements, then a more detailed Stage 2 risk analysis is required. The Stage 2 process requires more site-specific data. This Protocol contains necessary consequence graphs and failure rate data tables that the user can use to estimate the risk for a school site. An Individual Risk Criterion is provided for evaluating the quantitative analysis results. It is recommended that any assessment that utilizes modifications or deviations from the Protocol guidance methodologies or defaults be noted, explained and justified as a reasonable alternative approach.

Under certain conditions, a Stage 3 analysis might be required for a school site. A Stage 3 analysis applies for circumstances not covered in this Protocol, which include special situations of site topography, unusual configurations of the pipeline or school site, or the specific product being transported in the pipeline. A Stage 3 assessment is needed for special complex pipeline scenarios that are beyond the scope of the scenarios analyzed in this Protocol. The simplified approaches presented in this Protocol is not directly applicable for complex or atypical pipelines such as those transporting liquefied gases or toxic, hazardous substances. In these cases, a more detailed risk analysis may be needed. However, the general methodology in this document can still be used as a guide for carrying out the more detailed Stage 3 risk analyses.

The Protocol also provides standard reporting forms that a LEA can use to record risk analysis results. These forms have been designed for submittal of risk analysis results to the

CDE. Use of these standard forms will expedite both the organization of the information as well as the review of data because all schools are expected to use the same data submittal format.

If a LEA's risk analysis fails to meet the CDE Protocol Individual Risk Criterion, the district can request from CDE an exemption to the Title 5 standard. Per Title 5, Section 14010(u), CDE may grant exemptions if the LEA can demonstrate that mitigation of specific circumstances overrides a standard without compromising a safe and a supportive school environment. CDE would determine this on a case-by-case basis.

This Protocol is designed based on the intended purpose and considerations of use by the LEAs, their contractors, and CDE. The Protocol is designed to provide reasonable estimates of risk from pipeline failures without undue detail, but with sufficient detail to meet the criterion of reasonableness. It is a tool to aid LEAs and CDE in evaluating the suitability of new school sites located near pipelines as defined in the regulations. The methodology is for policy guidance for which standardization of methodology base data were desirable. It is intended to be usable by an informed technical person, not necessarily a risk assessment expert. Data sources and methods had to be publicly accessible, preferably at little or no cost. Previous government methods, models and data took precedence over individual preferences. The hierarchy of methodology and data from authoritative sources is government agencies, industry groups, other learned institutions (non-government), private companies, and individuals. The basis of calculations is intended to be "transparent" or traceable to a reference source that provides necessary technical details, when the details are not themselves included in the Protocol document.

### **1.3 Manual Organization**

Section 1, Volume 1 of this Protocol document provides a brief introduction to this Protocol. Section 2 provides an overview of Risk Analysis including causes of pipeline failure and prevention and mitigation measures that can reduce the risk. Section 3 briefly discusses the consequences and likelihood of pipeline failures. Section 4 guides the reader through the process for preparing the pipeline risk analysis. An example risk analysis is also included in Section 4 that describes how to apply the pipeline risk analysis method and complete the Risk Calculation Form. Section 5 of this Protocol describes the risk analysis report contents including the reporting forms for submitting the risk analysis. Section 6 lists the references cited in this report, as well as other related references.

Volume 2, a background information manual, complements the current volume with more details on methods and data.